REMARKS

Reconsideration of the present application is respectfully requested. With entry of the amendments submitted herein, in which four new dependent claims numbered 86-89 are added, claims 1-38 and 83-89 will be pending, of which claims 1-26 and 83-89 will be under consideration, with claims 27-38 being withdrawn.

The applicants wish to thank the examiner for the recognition that claims 83-85 are in condition of allowance.

Claims 1, 3-9, 14-21 and 26 are rejected under 35 U.S.C. §103(a) as being unpatentable over Suzuki, et al. (6,514,855) in view of Baklanov, et al. (6,593,251), Matsuki, et al. (6,559,520) and Shioya, et al. (6,852,651). Furthermore, claims 10 and 22 are rejected under 35 U.S.C. §103(a) as being unpatentable over Suzuki, et al. (6,514,855), Baklanov, et al. (6,593,251), Matsuki, et al. (6,559,520) and Shioya, et al. (6,852,651), as applied to claims 1, 3, 4, 9, 15, 16 and 21 above, and further in view of Chung (6,890,869).

We have considered the teachings of the references and the examiner's reliance on same. Concerning Suzuki, et al. the examiner notes that

> "Suzuki, et al. does not teach a silicon dioxide (SiO_2) layer formed on said second SiOCH layer, wherein said second SiOCH layer includes a hydrogen (H) density lower than that of said first SiOCH layer, and an oxygen (0) density higher than that of said first SiOCH layer."

Also, it is our observation that Suzuki, et al. teaches that a hydrocarbon cover layer is applied over the second SiOCH layer as an insulating film. See col. 5, lines 27-29. Thus, it appears that Suzuki, et al. teaches away from the present invention in that it discloses a 2d SiOCH layer with different element concentrations and a different insulating layer when compared to the present invention.

The secondary references (Baklanov, et al., Matsuki, et al., and Shioya, et al.), in our view, do not disclose or suggest the specific density relationships of H and O between the first and second SiOCH layers as presently claimed herein. Baklanov, et al. may discuss concentration relationships of Si to O to C and Si to F, but it does not disclose differences in concentration for a given element from layer to layer, and is silent as to H concentration. Matsuki, et al. discloses a siloxane polymer formed by vaporizing a silicon-containing hydrocarbon according to a specific formula (see col. 2, lines 28-29) via CVD. There is no disclosure that the O, C, and H densities can be varied in first and second layers, let alone in these disclosures of first and second layers.

Shioya is cited to supply the teaching missing from the other cited references – the employment of an SiO_2 insulating layer over an SiOCH layer.

Upon review of the reference and their teachings, the applicants are of the view that the combined teachings fail to render claim 1 (and the claims which depend from it) unpatentable under §103(a). First of all, the combined teachings lack one element of the claim – that the hydrogen density of the second SiOCH layer is lower than that of the first SiOCH layer. Secondly, there is no disclosure in the secondary references to modify the teachings of the primary reference to develop a second SiOCH layer with a higher O density than in the first layer. There is nothing in the Baklanov, et al. reference that would lead to this modification and the examiner's reliance on same to supply the missing teaching is in our view, an impermissible hindsight reconstruction of the invention. Third, since the primary Suzuki reference teaches a hydrocarbon insulating layer, the examiner must point to the teaching or suggestion that would lead the person of skill in the art to modify Suzuki to employ the Shioya, et al. teaching of an SiO_2

insulating layer. The examiner has not supplied this motivation.

We strongly disagree with the Examiner's assertion concerning the merits of the rejection. First of all, the hydrogen density of the second SiOCH layer is lower than that of the first SiOCH layer, and there is no disclosure in the secondary references to modify the teachings of the primary reference to develop a second SiOCH layer with a higher oxygen density than in the first layer.

Second, it is not understood how the Examiner can support her position that Suzuki et al. teaches the second SiOCH layer being a porous SiOCH layer. Matsuki et al. teaches a porous SiOCH layer having higher oxygen concentration, and the advantages thereof. As understood, Matsuki et al. teaches a method of forming a siloxane polymer insulation film on a semiconductor substrate by plasma treatment having the formula - SiR_2O – (where R_2 is a hydrocarbon). There simply is no teaching that oxygen concentration is higher than in a first layer, contrary to the Examiner's assertion of same.

Nothing in Suzuki teaches that oxygen content or carbon content can be adjusted relative to respective contents of same in an adjacent first layer.

Furthermore, in Suzuki, the porous structure of the SiOCH layer (13) is derived from O_2-plasma treatment, as stated in column 5, lines 12-19. On the contrary, in the Applicant's invention, the second SiOCH layer (30) is formed by the He-plasma treatment and the N_2O-plasma treatment, as disclosed in the specification, from page 15, line 29, to page 16, line 24. Namely, in the He-plasma treatment, a part of $Si\text{-}CH_3$ bonds, and a portion of Si-H bonds are released to produce dangling bonds in the surface of the SiOCH layer 28. The surface of the SiOCH layer 28 is then subjected to the N_2O-plasma treatment (i.e., the thermal oxidization treatment), resulting in the formation of

the second SiOCH layer (30) on the SiOCH layer 28. Thus, the second SiOCH layer (30) cannot have a porous structure, and features the low carbon (C) density, the low hydrogen (H) density and a high oxygen (O) density.

If, on the other hand, the SiOCH layer 28 is subjected to only the O_2-plasma treatment (Suzuki) or the N_2O-plasma treatment without the He-plasma treatment, it is impossible to obtain the second SiOCH layer (30), because the SiOCH layer (28) may be wholly reformed and modified, due to the poor oxidation resistance property thereof, as discussed in the specification, from page 4, line, to page 5, line 5.

Accordingly, Suzuki cannot be the bar to the patentability of the rejected claims.

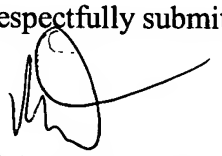
New claims 86-89 are added herein. Since the second SiOCH layer (30) is obtained by reforming a surface of the SiOCH layer (28) with the He-plasma treatment and the N_2O-plasma treatment, for the purpose of improving an adhesion property between the second SiOCH layer (28) and the silicon dioxide layer (32), the second SiOCH layer (30) is considerably thinner than that of the remaining section (first SiOCH layer) of the SiOCH layer (28). In this case, the first SiOCH layer (28) serves as an insulating interlayer, the second SiOCH layer (30) serves as an insulating interlayer, and the second SiOCH layer (30) serves as an adhesion-property improving layer.

On the other hand, in Suzuki, a thickness of the first SiOCH layer (12) is 20 nm (column 4, line 52) and a thickness of the second SiOCH layer (13) having the porous structure is 400 nm (column 4, line 65). The second SiOCH layer (13) serves as insulating interlayer.

In this regard, the new claims 86-89 can be clearly distinguished from Suzuki.

Accordingly, for the reasons set forth above, it is submitted that the claims are in condition of allowance and a relatively early reply would be appreciated.

Respectfully submitted,



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